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each triangular contour including a bottom edge on an outer side of the mounting section and a vertex opposing the bottom edge on a central side of the mounting section, the bottom edge being parallel to a minor edge of the semiconductor device mounted on the substrate.

18. (Amended) The semiconductor device mounting method in accordance with claim 17, wherein the solder resist zones have a thickness ranging from 10 μm to 30 μm .

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20. (Amended) The semiconductor device mounting method in accordance with claim 17, wherein the solder resist zones have a thickness ranging from 10 μm to 30 μm and the sealing resin is a epoxy-based instantaneous thermosetting resin having a contraction ratio and an expansion ratio of cured resin, the contraction ratio larger than the expansion ratio.

REMARKS

An Office Action was mailed on January 14, 2002. Claims 1 – 20 are pending in the present application. With this response, amendments are made to claims 1, 2, 4, 6, 8 – 10, 12 – 14, 16 – 18 and 20. No new matter is introduced. Claim 3 is canceled without prejudice.

CHANGE OF ATTORNEY INFORMATION

The law firm of Helfgott and Karas, P.C. joined Rosenman & Colin LLP on September 1, 2001. The correspondence information for all current Helfgott & Karas files was changed with the USPTO by formal, electronic communication. This is to

confirm that all future correspondence in this matter should be directed to Rosenman & Colin LLP, 575 Madison Avenue, New York, New York, 10022-2585, Phone: (212) 940-8800, Fax: (212) 940-8776. The attorney docket number has also changed to **NECU 18.117 (100806-17344)** and it is respectfully requested that the Examiner update such information in the PALM system.

OBJECTION TO DRAWING

The drawing is objected to as failing to comply with 37 C.F.R. § 183 (a) as failing to show every feature of the invention. Applicant includes proposed red-line changes to FIGs. 5 and 6 and an accompanying amendment to the specification, and will proceed to submit formal revisions to the drawing upon approval of the proposed red-line changes and allowance of the present application. No new matter is introduced. With approval of these changes, Applicant respectfully requests that the Examiner withdraw the objection to the drawing.

DUPLICATE CLAIM

The Examiner advises that, if found allowable, one of claims 2 and 3 will be objected to under 37 C.F.R. § 1.75 as being duplicative of the other. Applicant thanks the Examiner for providing this advice, and cancels claim 3 without prejudice in order to avoid this objection.

REJECTIONS UNDER 35 U.S.C. § 112

Claims 1 – 20 are rejected under 35 U.S.C. § 112 as being indefinite and having grammatical errors. Applicant amends claims 1, 2, 4, 6, 8 – 10, 12 – 14, 16 – 18 and 20

to overcome the rejections. The Examiner finds that the terms “instantaneous thermosetting resin” and “a contractions ratio and an expansion ratio of cured resin” are insufficiently defined in claims 7, 8, 11, 12, 15, 16, 19 and 20. Applicant respectfully traverses this rejection, submitting that adhesives having these characteristics are well known in the industry. No new matter is introduced. Applicant believes claims 1 – 20 stand in condition for allowance, and respectfully requests the Examiner to withdraw the rejections under 35 U.S.C. § 112.

REJECTIONS UNDER 35 U.S.C. § 102

Claims 1 – 4 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,763,295 to Tokuno et al. Claims 5, 6, 9 and 10 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,804,882 to Tsukagoshi et al. Applicant respectfully traverses these rejections.

A claim is anticipated only if each and every element as set forth in the claim is found expressly or inherently in a cited reference. *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Tokuno discloses a device module including a circuit chip and a printed circuit having a pattern of etched grooves that protrude from the periphery of the chip mounting area (see, e.g., FIG. 2A of Tokuno). After the chip is positioned on the printed circuit, sealing resin is injected at the protrusions in order to direct the resin under the chip for sealing. In at least one embodiment, a fillet is externally applied to the periphery of the chip after the sealing resin to further flow under the chip by capillary action (see, e.g., FIG. 3C).

Applicant's claimed invention of independent claims 1, 2 and 4 teaches a semiconductor mounting device having a plurality of solder resists positioned between and extending toward end portions of semiconductor device mounting pad lines that help to spread a sealing resin uniformly when the device is mounted. In Tokuno, the solder resist portions defining the protrusions clearly extend beyond the end portions of mounting pad lines in order that the sealing resin can be injected under the chip from an external position. In sharp contrast, Applicant's claimed invention provides for the resin to be spread from an internal position toward corners of the device when the device is placed on the mounting pads. Accordingly, Applicant's invention avoids external application of sealing resin altogether.

Tsukagoshi discloses a semiconductor device comprising a semiconductor chip, a substrate, and spacers interposed together with an adhesive between the chip and the substrate. Although Tsukagoshi teaches arranging spacer elements to promote a smooth flow of adhesive from the center of the assembly to the periphery, unlike Applicant's claimed invention of independent claims 5 and 9, Tsukagoshi does not teach a structure that is arranged to spread the sealing resin such that a filet is formed around the circumference of the device, where the filet is uniform in quantity of resin.

In summary, the Tokuno and Tsukagoshi fail to respectively teach all elements of Applicant's invention as claimed in independent claims 1, 2 and 4 and independent claims 5 and 9. Accordingly, Applicant believes these claims are in condition for allowance, and respectfully requests the Examiner to withdraw the rejections under 35 U.S.C. § 102.

REJECTIONS UNDER 35 U.S.C. § 103

Claims 13, 14, 17 and 18 is rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,647,123 to Greenwood et al. in view of Tsukagoshi. Applicant respectfully traverses these rejections.

To establish a prima facie case of obviousness under 35 U.S.C. § 103(a), three criteria must be met. First there must be some suggestion or motivation to combine the references. Second, there must be a reasonable probability of success. Finally, the references must teach or suggest all the claim limitations. MPEP 2142.

Greenwood discloses a method for applying underfill between a flip chip die and a circuit board. Underfill is applied at protruding channels 304, 316 in order to flow the underfill under the flip chip die. Thus, unlike Applicant's claimed invention, for example as claimed in independent claims 13 and 17, Greenwood does not teach or suggest applying sealing resin by one-point coating on to a central position of a mounting section, mounting the semiconductor device on the mounting section and forming a sealing resin filet in a circumferential area of the device, where the filet is uniform in quantity of resin. As previously argued, Tsukagoshi also fails to teach or suggest this claimed limitation.

Additionally, as noted by the Examiner, neither Greenwood nor Tsukagoshi teach the limitations of Applicant's independent claims 13 and 17 requiring two or more solder resist zones having a trapezoidal contour. The Examiner suggests that selection of the trapezoidal shape is merely a matter of non-critical design choice. Applicant respectfully disagrees. The resist zone geometries selected and claimed by Applicant were found to

exhibit a specific, desired behavior described by Applicant beginning at page 12, line 14 of Applicant's specification:

In the embodiments having the solder resist patterns with thickness described above, the resin being expanded can naturally surmount the resist patterns. However, the flow of the resin is facilitated in different ways between an area with the pattern and an area without the pattern. Using the difference in the easiness of flow between these areas, the resin flow is oriented toward the corner areas of the device 4. Resultantly, almost an equal quantity of resin can be supplied to the central section and to the corner areas of the device 4 in the mounting process.

Thus, Applicant's claimed resist zone geometries are not obvious over the cited art as a simple matter of design choice, but were selected and evaluated to produce a specific and beneficial result.

Accordingly, and for the reasons recited above, Applicant respectfully suggests that independent claims 13 and 17 stand in condition for allowance. Applicant respectfully requests the Examiner to withdraw the rejections under 35 U.S.C. § 103.

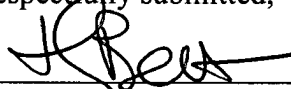
CONCLUSION

An earnest effort has been made to be fully responsive to the Examiner's objections. In view of the above amendments and remarks, it is believed that claims 1, 2 and 4 – 20, consisting of independent claims 1, 2, 4, 5, 9, 13 and 17 and the claims dependent therefrom, are in condition for allowance. Passage of this case to allowance is earnestly solicited. However, if for any reason the Examiner should consider this application not to be in condition for allowance, he is respectfully requested to telephone the undersigned attorney at the number listed below prior to issuing a further Action.

Attached is a marked up version of the changes made to the specification and claims by the current amendment. The attached pages are captioned **“Version With Marks To Show Changes Made”**.

Any fee due with this paper may be charged on Deposit Account 50-1290.

Respectfully submitted,



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